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EXAMINER

LEUNG, RICHARD L

ART UNIT	PAPER NUMBER
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3744

DATE MAILED: 12/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/734,948

Applicant(s)

KAMIMURA ET AL.

Examiner

Richard L. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: the recitations of "a beginning of an evaporation" and "an ending of the evaporation" are unclear.

Appropriate correction is required.

Drawings

2. The drawings were received on 14 October 2004. These drawings are not acceptable for the following reason.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "160" has been used to designate both the first and second evaporator in the amended figure. It is suggested that the second evaporator be labeled with a different reference character, and that this reference character be included in the written description where appropriate. Alternatively, a new figure showing the plurality of evaporators could be added to the originally presented drawings, again accompanied by appropriate changes to the written description. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the

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examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how an additional evaporator can be added to the refrigerating cycle as a plurality of evaporators. As best understood, this limitation will be treated as meaning adding an additional evaporator to establish a plurality of evaporators in the refrigerating cycle. However, appropriate correction is still required to overcome this rejection.

6. Claims 5 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "hyper critical state" as recited in the claims does not appear to be a term widely recognized in the art, nor is it clearly defined in the specification. As best understood, the phrase "hyper critical state" shall be treated as being equivalent to --super critical-- in this action. However, clarification regarding "hyper critical state" will still be needed to overcome this rejection.

7. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites the phrase, "outlet side of the evaporator,"

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on the last line. However, it is unclear to which evaporator the claim is referring because the claim depends from claim 7, which introduces a plurality of evaporators.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Richard et al. (US-5736063). Richard et al. discloses non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant. Example 51 in Table 2 discloses a specific refrigerant composition containing carbon dioxide and a combustible hydrocarbon, propane. Example 27 in Table 2 discloses a specific refrigerant composition containing carbon dioxide and a combustible HFC refrigerant, HFC-32. As best understood, these non-azeotropic mixtures inherently exhibit a temperature glide, wherein the temperature glide can produce a first temperature range between a beginning of an evaporation and an intermediate temperature for use as a refrigeration area, and a second temperature range from the intermediate temperature to a temperature at an ending of the evaporation for use as a cold storage area. See Response to Arguments below.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 4, 7/4, and 8/7/4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radermacher et al. (US-5092138) in view of Richard et al. (US-5723063). Radermacher et al. disclose, with particular reference to the figure, a refrigerating device comprising a refrigerating cycle in which a compressor 4, a heat radiator (condenser 5), an expansion mechanism (not labeled, but depicted schematically at the bottom of the figure), and an evaporator (low-temperature evaporator 1) are connected by a refrigerant path. It is further shown that there is a second evaporator (high-temperature evaporator 2) in series connection with the low-temperature evaporator 1, and an auxiliary heat exchanger 3 that is arranged between the outlet side of the heat radiator 5 and the inlet side of the expansion mechanism and between the outlet side of the evaporator 2 and the inlet side of the compressor 4. Although the refrigerating device disclosed by Radermacher et al. uses mixed refrigerants (see columns 2 and 3), some of which contain the ozone-depleting HCFC, chlorodifluoromethane (also known as HCFC-22 and R-22), the reference fails to disclose the carbon dioxide refrigerant mixture required by the claims. Richard et al. teaches the use of non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant, as already discussed above regarding claims 1-3. Accordingly, it would have been obvious to one of ordinary skill in the art to use in the refrigerating system disclosed by Radermacher et al. the refrigerant compositions taught by Richard et al. because Richard et al. teach that such

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compositions are suitable replacements for chlorodifluoromethane (column 3, lines 31-32) that will not deplete the ozone layer.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (US-6178761 B1) in view of Richard et al. (US-5723063). Karl discloses a refrigerating cycle that uses a carbon dioxide refrigerant comprising a compressor 4, a heat radiator 8, an expansion mechanism 10, and an evaporator 11, all of which are connected by a refrigerant path. It is disclosed that the refrigerant used in this system is subjected to a supercritical state (column 1, line 66) inherently at a high-pressure side of the evaporator, which as best understood, is equivalent to a "hyper critical state," as recited by the claim. Karl fails to disclose the use of the mixed refrigerant required by the claim. Richard et al. teach the use of non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant as already discussed above regarding claims 1-3. Accordingly, it would have been obvious to one of ordinary skill in the art to use the refrigerant mixture taught by Richard et al. in the system disclosed by Karl because the refrigerant mixture is intended for use in vapor-compression refrigerating cycles, such as the one disclosed by Karl, and such a refrigerant mixture is an environmentally safe refrigerant.

13. Claims 7/5 and 8/7/5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (US-6178761 B1) in view of Richard et al. (US-5723063) as applied to claim 5 above, and further in view of Radermacher et al. (US-5092138). The combination of Karl and Richard et al., as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator that

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are connected by a refrigerant path, in which a non-azeotropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate a plurality of evaporators, wherein a low temperature evaporator and a high temperature evaporator are arranged in series, as required by the claims. Radermacher et al. teach a refrigeration device using a mixed refrigerant working fluid that comprises a low-temperature evaporator 1 arranged in series with a high-temperature evaporator 2. It would have been obvious to one of ordinary skill in the art to modify the refrigeration system demonstrated by the combination of Karl and Richard et al. to include the plurality of evaporators taught by Radermacher et al. because Radermacher et al. teach that such an arrangement can be used in devices wherein two separate compartments can be kept at different temperatures (column 2, lines 26-29). Claim 8 requires an auxiliary heat exchanger specifically placed in the refrigeration circuit. Karl already discloses such a heat exchanger E.

14. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (US-6178761 B1) in view of Richard et al. (US-5723063) and Vander Woude et al. (US-6631621 B2). The combination of Karl and Richard et al., as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator that are connected by a refrigerant path, in which a non-azeotropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate that the evaporator is operated at the triple point of carbon dioxide as

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required by the claim. Vander Woude et al. teaches a refrigerating system, which can use carbon dioxide as the cryogen (refrigerant), wherein there is an evaporator coil 42 for vaporizing the cryogen. It is taught by Vander Woude et al. that preferably the evaporator coil is maintained (by a pressure regulator) at a state equal to or slightly above the triple point of the refrigerant. See column 5, lines 29-35. It would have been obvious to one of ordinary skill in the art to operate the evaporator demonstrated by the combination of Karl and Richard et al. at the triple point of carbon dioxide taught by Vander Woude et al. because, as understood, the triple point represents the lowest temperature and pressure at which the refrigerant can exist in the liquid phase and therefore provide the greatest cooling power in the evaporator.

15. Claims 7/6 and 8/7/6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (US-6178761 B1) in view of Richard et al. (US-5723063) and Vander Woude et al. (US-6631621 B2) as applied to claim 6 above, and further in view of Radermacher et al. (US-5092138). The combination of Karl, Richard et al. and Vander Woude et al., as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator, operated at the triple point of carbon dioxide, that are connected by a refrigerant path, in which a non-azeotropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate a plurality of evaporators, wherein a low temperature evaporator and a high temperature evaporator are arranged in series, as required by the claims. Radermacher et al. teach a refrigeration device using a mixed refrigerant working fluid that comprises a low-

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temperature evaporator 1 arranged in series with a high-temperature evaporator 2. It would have been obvious to one of ordinary skill in the art to modify the refrigeration system demonstrated by the combination of Karl, Richard et al., and Vander Woude et al. to include the plurality of evaporators taught by Radermacher et al. because Radermacher et al. teach that such an arrangement can be used in devices wherein two separate compartments can be kept at different temperatures (column 2, lines 26-29). Claim 8 requires an auxiliary heat exchanger specifically placed in the refrigeration circuit. Karl already discloses such a heat exchanger E.

Response to Arguments

16. Applicant's arguments, filed 14 October 2004, with respect to the objections made to the abstract, specification, and claims 1 and 3 have been fully considered and are persuasive in view of the amendment. These objections have been withdrawn.

17. Applicant's arguments, filed 14 October 2004, with respect to the rejection of claim 7 under 35 U.S.C. 112, second paragraph has been fully considered and are persuasive in view of the amendment. This rejection has been withdrawn.

18. Applicant's arguments, filed 14 October 2004, with respect to the rejections of claims 5, 6, and 8 under 35 U.S.C. 112, second paragraph have been fully considered but they are not persuasive. The amendment to the claims does not correct the issues discussed in the prior action, nor were any arguments made traversing the rejections. Therefore, these rejections have been repeated.

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19. Applicant's arguments, filed 14 October 2004, with respect to the rejections of claims 1-3 under 35 U.S.C. 102(b) as being anticipated by Richard et al. (US-5736063) have been fully considered but they are not persuasive.

Applicant has asserted that the reference of Richard et al. does not disclose the arrangement of the "temperature glide" to have the cold storage area and the refrigeration area, as recited in the amended claim 1. Examiner respectfully points out that claim 1 is drawn to a composition of matter and that the recited limitation of having a temperature glide producing a first temperature range "between a beginning of an evaporation and an intermediate temperature for use as a refrigeration area, and a second temperature range from the intermediate temperature to a temperature at an ending of the evaporation for use as a cold storage area" is considered simply to be a property of the composition. Therefore, if it can be shown that the composition is anticipated by the prior art, then the claim is anticipated as well since the prior art composition must inherently demonstrate the recited property. See MPEP § 2112.01.

In this case, claim 1 is drawn to a refrigerant composition comprising carbon dioxide and at least one kind of combustible refrigerant having the property already mentioned above. Minus any further details in the claim, the specification must be relied upon to determine what specific details of the composition are required to produce the recited property. Paragraph [0017] of the specification recites, "The non-azeotropic refrigerant mixture of the present invention comprises carbon dioxide and at least one kind of combustible refrigerants. The combustible refrigerant can be hydrocarbon series combustible refrigerant (such as...propane...) or HFC series

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combustible refrigerant (such as R32...)..." An example was used to illustrate that carbon dioxide at 50 mass % yielded a maximum temperature glide in one mixture, and it was further stated that the amount of carbon dioxide should be at 40-90 mass %. No other critical elements of the composition were apparent from the disclosure. Richard et al., as discussed above, discloses various refrigerant mixtures that comprise carbon dioxide and combustible refrigerants such as R-32 and propane (see Table 2). Richard et al. further disclose that the weight percent of the carbon dioxide can be 50% of the mixture. While Richard et al. does not specifically mention the arrangement of the "temperature glide" to have the cold storage area and the refrigeration area, such a property is inherent in the compositions disclosed by Richard et al. because the compositions are identical to the composition of the present invention, and therefore Richard et al. anticipates the claim.

20. Regarding claims 4-8, Examiner agrees with Applicant's statement that Karl, Vander Woude, and Radermacher each disclose the refrigerating cycle paths of the present invention as recited by the claims. Therefore these claims are considered unpatentable over the combination of these references with the teachings of Richard et al.

21. Applicant's arguments, filed 14 October 2004, with respect to the rejections of claims 1-4 under 35 U.S.C. 102(b) as being anticipated by Powell et al. (US-6117356) and the rejections of claims 5-8 under 35 U.S.C. 103(a) as being unpatentable over Powell et al. in view of Karl (US-6178761 B1), Radermacher et al. (US-5092138), and Vander Woude et al. (US-6631621 B2) have been fully considered and are persuasive

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in view of the amendment to claim 1. While Powell et al. disclose a refrigerant mixture comprising carbon dioxide and at least one combustible refrigerant, Powell et al. fail to disclose a carbon dioxide percentage considered consistent with the present invention, as defined by the newly amended claim 1. That is to say, Powell et al. fail to disclose that the carbon dioxide is at 40-90 mass %, which as best understood from the specification, is deemed necessary to produce a composition with the temperature glide property recited by claim 1 as mentioned above. Therefore these rejections have been withdrawn.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard L. Leung whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise L. Esquivel can be reached on 571-272-4808. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard L. Leung
Examiner
Art Unit 3744

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